Moringa oleifera (Lam.) – (Moringaceae) is commonly known as horseradish tree or drumstick used as phytomedicine such as antioxidant, antimicrobic, anti-inflammatory, antipyretic, anti-diabetic, antioxidant, antiulcer and antitumor. Moringa oleifera (Lam.) root was successfully extracted with petroleum ether, ethyl acetate, chloroform, ethanol and aqueous extract were tested for antimicrobial activities against Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, Proteus mirabilis, Penicillium sp., Mucor sp., Aspergillus niger and Candida albicans by disc diffusion method. Ethyl acetate extract showed high antimicrobial activity against Pseudomonas aeruginosa (18.2 ± 0.2 mm). Chloroform extract were ineffective against Escherichia coli and Proteus mirabilis. Aqueous extract showed maximum number of inhibition against Penicillium sp. (13.1 ± 0.2 mm) than other extracts and Aspergillus niger were ineffective in all the extracts except aqueous extract. The phytochemical screening revealed the presence of alkaloids, flavonoids, saponins, terpenoids, steroids, tannins, cardiot glycosides, aminoacids and proteins.

Key words: Moringa oleifera (Lam.); Moringaceae; Phytomedicine; Phytochemical screening; Antimicrobial activity.

INTRODUCTION

Moringa oleifera (Lam.) belongs to the Moringaceae. The tree itself is rather slender, with drooping branches that grow to approximately 10 m in height. It is distributed in India, Sri Lanka and Africa [1]. Moringa oleifera (Lam.) has been extensively used as various phytotherapeutics such as anti-inflammatory [2], antipyretic [3 & 4], antitumor [5]. Anwar et al., reported antihypertensive, diuretic and cholesterol lowering activity of Moringa oleifera (Lam.) leaves [6].

Richa Gupta et al., (2005) reported chelating property against arsenic toxicity [7]. A total of forty four compounds were isolated from the leaves of Moringa oleifera (Lam.) [8] and four pure compounds were also isolated which showed a blood pressure lowering effect [9]. Moringine and Moringinine were the two alkaloids isolated from the stem bark of Moringa oleifera (Lam.) [10]. Methanol extract of Moringa oleifera (Lam.) root showed central nervous system depressant action was reported by Gupta et al.,(1999) [11]. The aqueous extract of Moringa oleifera (Lam.) root possess antifeedant property [12]. Moringa oleifera (Lam.) seed also exhibited cyanobactericidal activity [13]. Moringa oleifera (Lam.) leaves possess hypolipidemic and antiatherosclerotic activities [14]. Moringa oleifera (Lam.) seed has excellent coagulation properties for treating waste water proved by Anselmendabegesere et al.,,(1995) [15]. Moringa oleifera (Lam.) pods was studied for free radicals scavenging abilities [16]. The main aim of the present study is to evaluate the antimicrobial activity of sequential extracts of Moringa oleifera (Lam.) root.

MATERIALS AND METHODS:

Moringa oleifera (Lam.) root was collected in and around Annur district, Tamilnadu, India. The plant was identified and authenticated by Botanical Survey of India (BSI), Coimbatore wide No. BSI / SRC / 5 / 23 / 2010-11 - Tach-1849 and Voucher specimen was deposited at the same institute for future Reference.

Preparation of extraction:

The plant material was cut into small pieces and shade dried and ground to powder. About 500g of powdered plant material was sequentially extracted with petroleum ether, ethyl acetate, chloroform, ethanol, aqueous [1.5]. All the extracts were filtered using Whatmann No.1 filter paper and evaporated to dryness.

Microbial strains:

Pure cultures of bacterial strains Pseudomonas aeruginosa, Staphylococcus aureus, Escherichia coli, Proteus mirabilis and fungal strains Candida albicans, Aspergillus niger, Penicillium sp., and Mucor sp., were obtained from the Department of Microbiology, Karaugum University, Coimbatore.

Phytochemical screening:

Phytochemical screening was carried out to screen out the secondary metabolites present in Moringa oleifera (Lam.) root extract [17 & 18].

Antimicrobial assay:

Antibacterial activity was carried out according to the method of Bauer et al., [19]. Sterile disc (5mm) dipped in different concentration of extracts (5, 10, 15 mg/ml) and dried at 40ºC. Disc soaked in DMSO and standard antibacterial agent chloromphenicol (10µg/disc) was used as negative and positive control. The inocula (106 CFU) was spread on the sterile of nutrient agar medium plate using cotton swabs. The plates were incubated at 35º C for 20 minutes. The discs were placed and the plates were incubated at 37º C for 24 hours.

Similarly antifungal assay was carried by the above mentioned procedure in Sabouraud Dextrose agar (SDA) medium method. The standard streptomycin (10µg/disc) was used as positive control. Plates were incubated at 25ºC for 72 hours. The diameter of zone of inhibition was measured in mm. All the experiments were repeated in triplicates. The results were expressed Mean ± Standard deviation.

RESULTS AND DISCUSSION:

Phytochemical screening revealed the presences of secondary metabolites are shown in Table: 1. Moringa oleifera (Lam.) seed and leaf showed the presence of Flavonoids and saponins [20]. Antibacterial activities of Moringa oleifera (Lam.) root are shown in Table: 2 and Figure: 1. Moringa oleifera (Lam.) root of petroleum ether extract inhibits Pseudomonas aeruginosa (13.1±0.1 mm), Staphylococcus aureus (16.0±0.2 mm), Escherichia coli (10.2±0.2 mm). Chloroform extract was active against Pseudomona aeruginosa (12.±0.2 mm), Staphylococcus aureus (8.2±0.2 mm), Escherichia coli (10.1±0.1 mm) and Proteus mirabilis was ineffective to any of the concentrations used. Moringa oleifera (Lam.) root ethyl acetate extract was sensitive to Staphylococcus aureus (11.1±0.1 mm), Proteus mirabilis(10.2±0.2 mm). Ethanol extract showed activity against Pseudomonas aeruginosa (12.1±0.1 mm), Staphylococcus aureus(11.0±0.2mm), Escherichia coli(9.2±0.2 mm) and Proteus mirabilis (8.1±0.1 mm). Aqueous extract showed activity against Pseudomonas aeruginosa (11.2±0.2mm), Staphylococcus aureus(12.2±0.2mm), Escherichia coli(8.2±0.3 mm) and Proteus mirabilis (11.1±0.1 mm).

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<th>Table 1: Phytochemical Screening of Moringa oleifera (Lam.) root</th>
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<td>Extract</td>
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<tr>
<td>Petroleum ether</td>
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Figure 1: In vitro antibacterial activity of Moringa oleifera (Lam.) root extract.
Moringa oleifera (Lam.) leaf stalk had no effect against Pseudomonas aeruginosa, Staphylococcus aureus, and Aspergillus niger. However, it showed some activity against Candida albicans (6.0±0.2mm). Petroleum ether, chloroform, and ethyl acetate extracts showed the least inhibition against Candida albicans (6.0±0.2mm). Petroleum ether extract inhibited Candida albicans (6.0±0.2mm) and Penicillium sp. (8.0±0.2mm). Ethyl acetate extract showed antifungal activities against Candida albicans (7.0±0.3mm) and Penicillium sp. (6.0±0.2mm). Chloroform extract inhibited Candida albicans (7.0±0.3mm), Penicillium sp. (6.0±0.2mm), and Mucor sp. (8.0±0.2mm). Aqueous extract of Moringa oleifera (Lam.) root was ineffective against Escherichia coli and Proteus mirabilis. The minimum inhibition was observed ethyl acetate extract against Escherichia coli (6.0±0.2mm).

Antifungal activities are shown in Table 3 and Figure 2. Aqueous extract inhibited Penicillium sp. (13.0±0.2mm) and petroleum ether extract inhibited Mucor sp. (12.0±0.2mm) at a concentration of 15 mg/ml more effectively. Petroleum ether, chloroform, ethyl acetate, ethanol was ineffective against Aspergillus niger. Candida was ineffective against chloroform extract. The aqueous extract showed minimum inhibition against Candida (6.0±0.1mm). Penicillium sp. (9.1±0.3mm) and Mucor sp. (9.1±0.3mm). Ethanol extract inhibits fungal pathogens Candida albicans (10.0±0.2mm) and Penicillium sp. (9.1±0.3mm). Aqueous extract effectively inhibits Candida albicans (6.3±0.3mm), Aspergillus niger (9.1±0.1mm) and Mucor sp. (8.1±0.1mm).

**CONCLUSION:**

Moringa oleifera (Lam.) showed good antifungal activity and compared to standard. This is the first report on the antifungal activity of Moringa oleifera (Lam.) root extract. Hence in future identification and isolation of bioactive compounds from Moringa oleifera (Lam.) root could serve as natural antimicrobials source.

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**REFERENCES:**